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31 May 2004

URGENT

By Fax (612 6285 3929) &
By A R Registered Post

The Commissioner of Patents
Australian Patent Office
Discovery House
47 Bowes Street, Phillip
Canberra A.C.T. 2606, Australia

Attention : S. Ghosh

Dear Sir

International Application No. PCT/SG2003/000177 filed on 24 July 2003

Invention Title : A Piling Device

Applicants : (1) WONG Yew Kee
(2) YIP Hoi Thong

1. We act for both the applicants in the captioned international application.

Response to Written Opinion

2. The applicants have instructed us to respond to the Written Opinion with mailing date 20 April 2004 by submitting:
 - a. amendments to the claims; and.
 - b. arguments on the novelty and inventive step of the claims as amended.

Written Opinion

3. In the Written Opinion, the Examiner gave his opinion that claims 1-3, 7-9, 11-13, 15-17 are lacking in novelty, and claims 1-13, 15-17 are lacking in inventive step. For the purposes of that opinion, the Examiner has considered the 6 prior art documents cited in the Written Opinion. According to the Examiner, cited document D1 (GB 2367322) explicitly discloses all the features of claims 1-3, 7-9, 11-13, 15-17 which are considered non-novel.

Amendments

4. As mentioned in paragraph 2 above, the applicants wish to submit amendments to the claims under Article 34 (2). Accordingly, we lodge* an amended set of claims (pages 11-14) together with a marked-up version thereof.
5. The amendments involve the following:
- a. combining original claims 7 and 8 as amended claim 7 and including therein an additional feature of a control panel for operating the pile gripping mechanism, including the selection of a desired gripping force;
 - b. combining original claims 9 and 10 as amended claim 8;
 - c. amending original claim 11 (amended claim 9 as re-numbered) to include the feature of vertically oriented hydraulic cylinders connected to and extending between each pair of frame and ground mounted footings (which is defined in original claim 14 and considered by the Examiner to be both novel and inventive);
 - d. amending original claim 14 (amended claim 12 as re-numbered) to exclude references to the term "vertical" (which is now referred to in amended claim 9); and
 - e. deleting original claim 17 (which is an omnibus claim).

Arguments6. Claims 1 to 3

- 6.1 None of the cited prior art documents disclose a piling device in accordance with claim 1 of the present application.
- 6.2 More specifically, none of the prior art documents disclose a piling device having a pile gripping mechanism and a pile driving mechanism, with both the gripping mechanism and driving mechanism being pivotally connected to and supported by a support frame. Further, none of the prior art documents disclose a pivotal connection between gripping and pile driving mechanisms and a support frame to enable a pile gripped by the gripping mechanism to be aligned in the desired orientation relative to the frame prior to being driven into the ground.
- 6.3 This arrangement is illustrated in the drawings of the present application, whereby the pile driving mechanism (26) is pivotally connected to the beam (16) of the support frame (12) at pivots (34). The pile gripping mechanism (22) is connected to the driving mechanism (26), such that (as stated at page 9, lines 4 to 9) the clamping mechanism (22) and driving mechanism (26) can be angularly adjusted relative to the frame (12) prior to driving a pile into the ground.
- 6.4 None of the cited prior art documents disclose an arrangement whereby both a pile gripping mechanism and pile driving mechanism are pivotally connected to a support frame. Thus, the prior art arrangements make it difficult to orientate a pile relative to the support frame (and therefore relative to the ground) prior to driving the pile into the ground. Thus, ground unevenness and ground slope at a piling location is not easily accommodated using prior art piling arrangements.
- 6.5 By way of example, GB 2367322 discloses (at, for example, page 6, lines 7-8) a drive mechanism (in the form of hydraulic drive means (10)) that is housed inside a support frame (in the form of vertical frame (12)). The vertical frame (12) is mounted to a footing (in the form of a base frame (40)). The drive means (10) cannot be aligned in a desired orientation relative to the vertical frame (12). Instead, in this arrangement the vertical frame (12) and drive means (10) may be braced at a desired inclination relative to the base frame (40) - see page 6, lines 14 to 22 of GB 2367322. This arrangement is undesirable because angular adjustment of the vertical frame (12) relative to the base frame (40) can result in instability of the pile driver.

6.6 This potential problem does not exist in the invention of the present application because the support frame (12) is rigidly mounted on the footing (20).

6.7 In light of the above, it is submitted that independent claim 1 as well as dependent claims 2 and 3 are novel and inventive.

7. Claims 4 to 6

7.1 Claim 4 of the present application defines, inter alia, a support frame including at least one opening provided in the side thereof to facilitate removal of the device from around a pile partially extending from the ground.

7.2 The provision of at least one opening in the side of the frame is important because it enables the piling device to be relatively easily removed from around a pile extending upwardly from the surface of the ground. This feature is desirable in situations where a specific piling task must be aborted, such as where the pile encounters a rock or other immovable object during the piling process. Please refer to page 9, paragraph 4 of the description of the present invention.

7.3 Figure 1 of the present application illustrates openings (38) and (40) provided in the opposite sides of frame (12).

7.4 None of the prior art arrangements provide (or even suggest) a suitable solution to this often-encountered problem of moving a piling device after having to abort piling in a particular location. Instead, existing arrangements inadequately address this problem by having to first break or snap off the portion of pile extending from the ground prior to moving the piling device to a more suitable location. Breaking or snapping off a pile is a time consuming and difficult task.

7.5 The problem of having to move a piling device when part-way through piling a pile has long existed, but never suitably addressed (especially by the cited prior art documents) until the advent of the present invention. Accordingly, we consider the provision of frame openings, as claimed in independent claim 4 and dependent claims 5 and 6, to be clearly far more than a 'mere workshop improvement' as suggested by the Examiner.

8. Original Claims 7 and 8

- 8.1 Amended claim 7 is a combination of original claims 7 and 8 which is further amended to define the piling device as including a control panel for operating the pile gripping mechanism, including the selection of a desired gripping force (as stated at page 5, lines 28 and 29 of the specification).
- 8.2 None of the cited prior art documents disclose or suggest a hydraulic gripping means in which the gripping force is adjustable. Further, none of the prior art documents disclose or suggest a control panel for operating the gripping mechanism, including the selection of a desired gripping force.
- 8.3 In particular, GB 2367322 does not disclose a hydraulically operated mechanism for gripping the pile (11). Instead, at page 7, line 21, GB 2367322 discloses a drive head means (50) including hooks for hooking into eyelets provided in the upper end of a pile (11). This arrangement is used to initially lift the pile (11). At page 7, lines 25-26 of GB 2367322 it is stated that the drive head means (50) may then be switched to a second position in which the pile (11) is non-pivotal or fixed.
- 8.4 Further, GB 2367322 discloses an arrangement whereby the piling force is exerted by the drive head means (50) on the upper end of the pile (11). This differs from the present invention, in which the piling force is exerted via the gripping mechanism that grips about the pile periphery.
- 8.5 In the present invention, the pile is gripped by the gripping mechanism and driven into the ground by the driving mechanism. The gripping mechanism provides the gripping force for the resistance in between the surface area of the pile and the friction jaws of the support frame. Such gripping force may be adjusted according to the specific requirements and this helps to prevent sliding and tensile crack of the pile. The ability to select a desired gripping force is important since it helps to avoid a situation whereby the gripping force is inadequate, in which case the pile will slide. It will also help to avoid a situation whereby the gripping force is too strong, in which case the pile will crack.

9. Original Claims 9 and 10

- 9.1 Amended claim 8, is a combination of original claims 9 and 10. The provision in amended claim 8 of the driving mechanism including a driving frame and hydraulic

cylinders extendable downwardly relative to the driving frame, and the lower end of the cylinders being connected to the gripping mechanism renders the claim both novel and inventive.

- 9.2 The present invention, as claimed in amended claim 8, is an **inherently stable structure**. This is because (referring to the drawings) the lower end of the support frame (12) is mounted on a footing (20), with the upper end of the pile driving mechanism (26) connected to the upper end of the frame (12). Further, the pile driving mechanism (26) extends downwardly relative to the frame (12) and the gripping mechanism (22) is connected to and extends downwardly from the lower end of the pile driving mechanism (26). Thus, unlike many existing arrangements, the pile driving and pile gripping mechanisms of the present invention are unable to extend upwardly beyond the height of the upper end of the frame, which has the potential to create an unstable and potentially very dangerous structure.
- 9.3 In the present invention, the gripping mechanism operates by gripping the pile at the lower end instead of the upper end. This enables the driving mechanism to achieve higher efficiency of the force transmission for driving a pile into the ground through the gripping mechanism. As highlighted above, this makes the piling device more stable.
- 9.4 The inherently dangerous problem of piling device instability has long existed but was never suitably addressed in existing piling arrangements. In fact, none of the cited prior art documents address (or even mention) the problem of piling device instability.
- 9.5 In light of the above, it is submitted that amended claim 8 is both novel and inventive.

10. Original Claims 11 to 16

- 10.1 Amended claim 9, corresponding to original claim 11, has been amended to include the feature of vertically orientated hydraulic cylinders connected to and extending between each pair of frame and ground mounted footings (as defined in original claim 14). We note that this feature was considered by the Examiner to be both novel and inventive.
- 10.2 The other amended claims 10-14, corresponding to original claims 12-16, depend directly or indirectly from amended claim 9. As such, these claims should also be considered to be both novel and inventive.

Concluding Remarks

11. The applicants intend to file further applications to protect this invention outside the Patent Cooperation Treaty System. The applicants would like to consider the Examiner's further comments (if any) before deciding on the aforesaid further applications which must be filed within the 12-month convention priority period ending on 24 July 2004. For this reason, we hereby on the applicants' behalf request for an expedited examination of this application. We hope to receive the further examination results from your office as soon as possible.

Yours faithfully



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Enclosures

CLAIMS

1. A piling device, including:
 - a support frame having a lower end mounted on a footing;
 - 5 a mechanism for gripping a pile;
 - a mechanism for driving the pile into the ground;
 - the gripping mechanism and the piling mechanism being pivotally connected to and supported by the frame;
 - the pivotal connection of the gripping and driving mechanisms to
 - 10 the frame enabling a pile gripped by the gripping mechanism to be aligned in the desired orientation relative to the frame prior to being driven into the ground.
2. A device according to claim 1, wherein the pivotal connection enables
- 15 angular adjustment of a pile gripped by the gripping mechanism relative to the frame.
3. A device according to claim 1, wherein a pivotal adjustment actuator is provided, the actuator including at least one hydraulically actuated cylinder
- 20 connected between the frame, and the driving and/or gripping mechanisms.
4. A piling device, including:
 - a support frame having a lower end mounted on a footing;
 - 25 a mechanism for gripping a pile;
 - a mechanism for driving the pile into the ground;
 - the gripping mechanism and the piling mechanism being connected to and supported by the frame; wherein
 - the frame includes at least one opening provided in the side thereof
 - 30 to facilitate removal of the device from around a pile partially extending from the ground.

5. A device according to claim 4, wherein the opening is sized to allow a pile partially extending from the ground to pass there through in the event that the frame has to be moved during the piling operation.
- 5 6. A device according to claim 4, wherein the device includes two openings located on opposite sides of the frame.
7. A piling device, including:
 a support frame having a lower end mounted on a footing;
 10 a mechanism for gripping a pile;
 a mechanism for driving the pile into the ground;
 the gripping mechanism and the piling mechanism being connected to and supported by the frame; wherein
 the gripping mechanism is hydraulically operated;
- 15 8. ~~A device according to claim 7, wherein,~~
 the gripping force applied by the gripping mechanism to a the pile is adjustable; and
a control panel is provided for operating the gripping mechanism,
 20 including selection of a desired gripping force.
98. A piling device, including:
 a support frame having a lower end mounted on a footing;
 a mechanism for driving a pile into the ground;
 25 the upper end of the pile driving mechanism is connected to the upper end of the frame and extends downwardly relative to the frame;
 a mechanism for gripping a pile; wherein
 the gripping mechanism is connected to and extends downwardly from the lower end of the pile driving mechanism; and
- 30 10. ~~A piling device according to claim 9, wherein~~

the driving mechanism includes a driving frame and hydraulic cylinders extendable downwardly relative to the driving frame, wherein the lower end of the cylinders are connected to the gripping mechanism.

5 449. A piling device, including:

a support frame having a lower end mounted on a footing;

a mechanism for gripping a pile;

a mechanism for driving the pile into the ground;

10 the gripping mechanism and the piling mechanism being connected to and supported by the frame;

the footing including ground mounted footings and respective frame mounted footings;

the frame mounted footings being movably mounted on the respective ground mounted footings; wherein and

15 ~~the footing enables movement of the piling device.~~ vertically orientated hydraulic cylinders connected to and extending between each pair of frame and ground mounted footings to facilitate movement of the device in the vertical direction relative to the ground and ground mounted footings.

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4210. A device according to claim 449, wherein the frame mounted footings are movably mounted on the respective ground mounted footings by the inclusion of roller bearing assemblies between the frame mounted footings and ground mounted footings.

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4311. A device according to claim 4210, wherein the bearings are connected to the frame mounted footings and/or ground mounted footings.

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4412. A device according to claim 449, wherein ~~vertically and/or horizontally~~ orientated hydraulic cylinders are connected to and extend between each pair of frame and ground mounted footings, to facilitate movement of the

device in ~~the vertical and/or a~~ horizontal directions relative to the ground
and ground mounted footings.

5 ~~45~~13. A device according to claim ~~449~~, including counterweights mounted on the
frame to prevent the frame from moving during the piling operation.

~~46~~14. A device according to claim ~~4513~~, wherein the device can be moved with
the counterweights mounted on the frame.

10 ~~17. — A piling device substantially as herein described and illustrated.~~

CLAIMS

1. A piling device, including:
 - a support frame having a lower end mounted on a footing;
 - 5 a mechanism for gripping a pile;
 - a mechanism for driving the pile into the ground;
 - the gripping mechanism and the piling mechanism being pivotally connected to and supported by the frame;
 - the pivotal connection of the gripping and driving mechanisms to
 - 10 the frame enabling a pile gripped by the gripping mechanism to be aligned in the desired orientation relative to the frame prior to being driven into the ground.
2. A device according to claim 1, wherein the pivotal connection enables
- 15 angular adjustment of a pile gripped by the gripping mechanism relative to the frame.
3. A device according to claim 1, wherein a pivotal adjustment actuator is provided, the actuator including at least one hydraulically actuated cylinder
- 20 connected between the frame, and the driving and/or gripping mechanisms.
4. A piling device, including:
 - a support frame having a lower end mounted on a footing;
 - 25 a mechanism for gripping a pile;
 - a mechanism for driving the pile into the ground;
 - the gripping mechanism and the piling mechanism being connected to and supported by the frame; wherein
 - the frame includes at least one opening provided in the side thereof
 - 30 to facilitate removal of the device from around a pile partially extending from the ground.

5. A device according to claim 4, wherein the opening is sized to allow a pile partially extending from the ground to pass there through in the event that the frame has to be moved during the piling operation.
- 5 6. A device according to claim 4, wherein the device includes two openings located on opposite sides of the frame.
7. A piling device, including:
 - 10 a support frame having a lower end mounted on a footing;
 - a mechanism for gripping a pile;
 - a mechanism for driving the pile into the ground;
 - the gripping mechanism and the piling mechanism being connected to and supported by the frame; wherein
 - the gripping mechanism is hydraulically operated;
 - 15 the gripping force applied by the gripping mechanism to the pile is adjustable; and
 - a control panel is provided for operating the gripping mechanism, including selection of a desired gripping force.
- 20 8. A piling device, including:
 - a support frame having a lower end mounted on a footing;
 - a mechanism for driving a pile into the ground;
 - the upper end of the pile driving mechanism is connected to the upper end of the frame and extends downwardly relative to the frame;
 - 25 a mechanism for gripping a pile; wherein
 - the gripping mechanism is connected to and extends downwardly from the lower end of the pile driving mechanism; and
 - the driving mechanism includes a driving frame and hydraulic cylinders extendable downwardly relative to the driving frame, wherein the
 - 30 lower end of the cylinders are connected to the gripping mechanism.

9. A piling device, including:
- a support frame having a lower end mounted on a footing;
 - a mechanism for gripping a pile;
 - a mechanism for driving the pile into the ground;
 - 5 the gripping mechanism and the piling mechanism being connected to and supported by the frame;
 - the footing including ground mounted footings and respective frame mounted footings;
 - the frame mounted footings being movably mounted on the
 - 10 respective ground mounted footings; and
 - vertically orientated hydraulic cylinders connected to and extending between each pair of frame and ground mounted footings to facilitate movement of the device in the vertical direction relative to the ground and ground mounted footings.
 - 15
10. A device according to claim 9, wherein the frame mounted footings are movably mounted on the respective ground mounted footings by the inclusion of roller bearing assemblies between the frame mounted footings and ground mounted footings.
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11. A device according to claim 10, wherein the bearings are connected to the frame mounted footings and/or ground mounted footings.
12. A device according to claim 9, wherein horizontally orientated hydraulic cylinders are connected to and extend between each pair of frame and
- 25 ground mounted footings, to facilitate movement of the device in a horizontal direction relative to the ground and ground mounted footings.
13. A device according to claim 9, including counterweights mounted on the
- 30 frame to prevent the frame from moving during the piling operation.

14. A device according to claim 13, wherein the device can be moved with the counterweights mounted on the frame.